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10/736,237	12/15/2003	Antonino Calabro	02CT39253415	3158

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EXAMINER	
COUGHLAN, PETER D	
ART UNIT	**PAPER NUMBER**
2129	

DATE MAILED: 12/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/736,237	Applicant(s) CALABRO ET AL.	
	Examiner Peter Coughlan	Art Unit 2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. This office action is in response to an AMENDMENT entered October 10, 2006 for the patent application 10/736237 filed on December 15, 2003.

2. The First Office Action of May 12, 2006 is fully incorporated into this Final Office Action by reference.

Status of Claims

3. Claims 6-23 are pending in this application.

35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 6-23 are rejected under 35 U.S.C. 101 for nonstatutory subject matter. The computer system must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77. The

invention is ineligible because it has not been limited to a substantial practical application. A method for performing a Simon's or Shor's quantum algorithm for the sole purpose of factoring a number has no real world practical application.

In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result achieved by the claimed invention is "useful, tangible and concrete." If the claim is directed to a practical application of the § 101 judicial exception producing a result tied to the physical world that does not preempt the judicial exception, then the claim meets the statutory requirement of 35 U.S.C. § 101.

The phrase 'performing a superposition operation according to the Shor's algorithm over a set of input vectors, and generating a corresponding superposition vector' is nothing more than an algorithm for factoring a number. There has to be a practical application for such an algorithm that factors a number.

The invention must be for a practical application and either:

1) specify transforming (physical thing) or

2) have the FINAL RESULT (not the steps) achieve or produce a

useful (specific, substantial, AND credible),

concrete (substantially repeatable/ non-unpredictable), AND

tangible (real world/ non-abstract) result.

A claim that is so broad that it reads on both statutory and non-statutory subject matter, must be amended, and if the specification discloses a practical application but

the claim is broader than the disclosure such that it does not require the practical application, then the claim must be amended.

An algorithm that can factor a number serves no purpose and is not statutory. These claims are stated within the theoretical realm without physical implementation.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 6, 9, 11, 16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The 'qubit' is not described within the specification regarding it's composition. What particle, element, molecule, compound or substance is the qubit composed of? Photons and molecules are examples that can be used as 'qubits' but the specification is silent regarding what the 'qubit' is composed of. The act of performing a 'superposition operation' is not described in detail. What is the

energy source, frequency and duration is used to set the 'qubits' into a superposition state? An 'entanglement operation' occurs but the applicant fails to disclose how the entanglement of two qubits is executed. Along with entanglement is the concept of 'decoherence' is ignored therefore bypassing all problems associated with 'decoherence'. All of these areas need to be addressed regarding a method of performing a Shor's quantum algorithm as a function (f(x)) encoded with n qubits for factoring a number.

Claims 8, 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There exists no algorithm or explanation concerning the final answer concerning the functions of 'cos', 'int' and 'sin'. Does the algorithm or explanation behave by truncation or does it round up at times and at other times round down?

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the

subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 7, 9-14, 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ulyanov et al in view of Cleve (U. S. Patent Publication 20040024750, referred to as **Ulyanov**; U. S. Patent Publication 20030005010, referred to as **Cleve**)

Claims 6, 9, 11, 16.

Ulyanov teaches performing a superposition operation according to the Shor's quantum algorithm over a set of input vectors, and generating a corresponding superposition vector, the performing comprising (**Ulyanov,** ¶0512; 'Input vectors' and 'superposition vector' of applicant is equivalent to "set of vectors' and 'linear superposition of cells' of Ulyanov.) calculating as a function of the n qubits a value ($1/2^{n/2}$) of non-null components of the superposition vector. (**Ulyanov,** p11, table 3.1:under 1D Uniform. ; This p(y) of Ulyanov is equivalent to ¶0144 and formula (6B) of applicant. The exponent of $^{n/2}$ of applicant is equivalent to "Δ" of Ulyanov. (note 'n' is a constant.))

Ulyanov does not teach calculating indices (i) of the 2^n non-null components of the superposition vector as an arithmetic succession, a seed of which is 1 and a difference of which is 2^n.

Cleve teaches calculating indices (i) of the 2^n non-null components of the superposition vector as an arithmetic succession, a seed of which is 1 and a

difference of which is 2^n (**Cleve,** ¶0071; '2^n non-null components' of applicant is equivalent to '$O(n^2)$' of Cleve. There is a one to one correlation between gates and components.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Ulyanov by having the values of 2n components generated as taught by Cleve to calculating indices (i) of the 2^n non-null components of the superposition vector as an arithmetic succession, a seed of which is 1 and a difference of which is 2^n ($i = 1 + 2^n (j - 1)$).

For the purpose of carrying out the superposition operation in a comparably very fast manner because it generates the superposition vector by identifying only the non-null components thereof by calculating, as a function of the number n of qubits

Ulyanov teaches performing an entanglement operation on the superposition vector, and generating a corresponding entanglement vector (**Ulyanov,** ¶0521; 'Entanglement operation' of applicant is equivalent to 'entanglement operator' of Ulyanov.); and performing an interference operation on the entanglement vector, and generating a corresponding output vector. (**Ulyanov,** ¶0521; 'Interference operation' of applicant is equivalent to 'interference operator' of Ulyanov.)

Claims 7, 10, 13, 18

Ulyanov teaches calculating indices (k) of the 2^n non-null components of the entanglement vector, summing to each term of the arithmetic succession a relative number corresponding to the value of the function (f(j)) calculated based upon a position (j) of the term in the succession ($k = f(j)+1+2^n (j -1)$) (**Ulyanov,** ¶0574; Ulyanov

illustrates the generation of entanglement operator based on initial position.); and a value of the non-null components of the entanglement vector being equal to the non-null components of the superposition vector. (**Ulyanov,** ¶0296; 'Equal' of applicant is equivalent to 'applied' of Ulyanov. Note—Applicant never states in the specification that the entanglement vector equals the superposition vector.)

Claims 12, 17.

Ulyanov teaches a first memory buffer for storing the value ($1/2^{n/2}$) and the indices (i). (**Ulyanov,** ¶0317; 'Memory buffer' of applicant is equivalent to 'register' of Ulyanov.)

Claims 14, 19

Ulyanov teaches a second memory buffer for storing the indices (k) of the 2^n non-null components of the entanglement vector. (**Ulyanov,** ¶0318; 'Memory buffer' of applicant is equivalent to 'register' of Ulyanov.)

Clams 20, 21, 22, 23

Ulyanov does not teach wherein the number comprises an integer number.

Cleve teaches wherein the number comprises an integer number (**Cleve**, ¶0027; Cleve illustrates an example using the number 15 which is an integer.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of Ulyanov by restricting inputs to be integers as taught by Cleve to have wherein the number comprises an integer number.

This eliminates the need to consider the additional factoring processing of 10^n where n is odd.

Response to Arguments

7. Applicant's arguments filed on October 10, 2006 for claims 9-23 have been fully considered but are not persuasive.

8. In reference to the Applicant's argument:

Applicants would like to thank the Examiner for the thorough examination of the present application. The independent claims have been amended to recite "for factoring a number" in order to overcome the nonstatutory subject matter rejection. Dependent claims are also being added to limit the "number" to an "integer number". Support in the specification may be found in paragraph 22, for example. The claim amendments and arguments supporting patentablity of the claims are provided below.

Examiner's response:

'Factoring a number' still lacks a practical application in a real world environment. What needs to be addressed is what purpose does the factorization of a number have within the real world and this purpose needs to be included in the specification. Examiner acknowledges new claims wherein the number comprises an integer.

9. In reference to the Applicant's argument:

The present invention, as recited in amended independent Claim 6, for example, is directed to a method for performing a Shor's quantum algorithm as a function (f(x)) encoded with n qubits for factoring a number. The method comprises performing a superposition operation according to the Shor's quantum algorithm over a set of input vectors, and generating a corresponding superposition vector.

The performing comprises calculating as a function of the n qubits a value ($1/2^{n/2}$) of non-null components of the superposition vector, and calculating indices (i) of the 2^n non-null components of the superposition vector as an arithmetic succession, a seed of which is 1 and a difference of which is 2^n. The method further comprises performing an entanglement operation on the superposition vector, and generating a corresponding entanglement vector. An interference operation is performed on the entanglement. vector, and a corresponding output vector representing the factored number is generated.

Independent Claim 9 is directed to a method for performing a Simon's quantum algorithm as a function (f(x)) encoded with n qubits for factoring a number. The method comprises performing a superposition operation according to the Simon's quantum algorithm over a set of input vectors, and generating a corresponding superposition vector.

The performing comprises calculating as a function of the n qubits a value ($1/2^{n/2}$) of non-null components of the superposition vector, and calculating indices (i) of the 2^n non-null components of the superposition vector as an arithmetic succession, a seed of which is 1 and a difference of which is 2^n. The method further comprises performing an entanglement operation on the superposition vector, and generating a corresponding entanglement vector. An interference operation is performed on the entanglement vector, and a corresponding output vector representing the factored number is generated.

Independent Claim 11 has been amended similar to amended independent Claim 6, and is directed to a quantum gate for performing a Shor's quantum algorithm.

Independent Claim 16 has been amended similar to amended independent Claim 9, and is directed to a quantum gate for performing a Simon's quantum algorithm.

The Examiner rejected Claims 6, 9, 11 and 16 based upon the claim recitation of 2^n ($i = 1+2^n(j-1)$) . The expression in parenthesis is in paragraph 73 of the specification. This expression is not part of the equation, and instead, indicates the values of the index i for which the i^{th} component of the vector P is non-null. Consequently, the expression in parenthesis in the independent claims has been cancelled.

II. The Specification Supports The Claims

Examiner's response:

The Examiner notes ¶0073 in the specification concerning ($i = 1+2^n(j-1)$) and notes the cancelled expression.

10. In reference to the Applicant's argument:

The Examiner rejected Claims 8 and 15 based upon the claim recitation of $int[(h-1)/2^n]$. Support in the specification may be found in paragraph 84, which states "the integer part is the function that generates the integer part of its argument." In other words, the "int" truncates its argument.

Examiner's response:

This statement is not supported in the specification.

11. In reference to the Applicant's argument:

The Examiner rejected Claims 7, 10, 13 and 18 based upon the recitation of "a value of the non-null components of the entanglement vector being equal to the non-null components of the superposition vector." The Examiner has taken the position that this phrase is not supported by the specification. However, paragraph 80 in the specification supports this recitation. The Applicants submit that the specification supports the claims, and that the above rejections be withdrawn by the Examiner.

Examiner's response:

Examiner withdraws this specification rejection.

12. In reference to the Applicant's argument:

III. The Claims Are Directed to Statutory Subject Matter

In a first rejection, the Examiner rejected independent Claims 6, 9, 11 and 16 as being directed to nonstatutory subject matter. Each of the independent claims has been amended to be limited to a practical application. In particular, the independent claims have been amended to recite that either the Shor's or Simon's quantum algorithm is performed as a function (f(x)) encoded with n qubits for factoring a number. Support in the specification may be found in paragraph 22. The Applicants submit that the claims are directed to a practical application, such as using Shor's or Simon's quantum algorithm as a function (f(x).) encoded with n qubits for factoring _a number.

In a second rejection, the Examiner has taken the position that the claimed subject matter contradicts prior art sources. For example, Claims 6, 9, 11 and 16 recite "calculating as a function of n qubits a value ($1/2^{n/2}$) of non-null components of the superposition vector." However, the Niesen reference states that qubit is infinite, which implies that the superposition vector is infinite in length to contain it. The Examiner has taken the position that this leads to the entanglement vector being infinite in length as well.

The Niesen reference states that qubits may assume infinite configurations, but not all these infinite configurations are processed in a quantum algorithm. To factor a number, only a limited number of configurations of an n-qubit are considered. Paragraph 25 of the specification clarifies how the number n of bits (and thus the number of configurations to be considered) is determined as a function of the number N to factor.

In a third rejection, the Examiner states that the claims lack novelty based on the nature of quantum computing and the duration of coherence. The Applicants submit that the claimed quantum algorithms are carried out through operations on vectors and matrices. They may be simulated by a computer or by utilizing hardware quantum gates. They are not carried out by looking at the spin of electrons as in the cited prior art references.

In a fourth rejection, the Examiner referenced Claim 1 which initially recited "Simon's or Shor's" algorithm. In the Preliminary Amendment, Claims 1-5 were cancelled and replaced with Claim 6-19. The currently pending claims separate out the two different algorithms to different sets of claims.

Examiner's response:

Applicant claims that the method can be carried out using hardware quantum gates but fails to state which quantum gate. Some examples of 'quantum gates' would be 'Fredkin gate', 'Hadamard gate', 'controlled gates', 'uncontrolled gates', 'rotational gate', 'Deutsch gate' and 'Toffoli gate'. Examiner acknowledges Applicant's admission that there are 4 inventions present in the application. This is due to the facts that Applicant claims implementation can be done by quantum hardware or by operations performed on vectors and mactrices and that factoring a number is accomplished by factoring a number using Shor's algorithm or by using Simon's algorithm resulting in four combinations.

13. In reference to the Applicant's argument:

In a fifth rejection, the Examiner states that generation of the superposition vector leads to a circular argument when the calculated indices of the 2^n non-null components is represented by (P) and the claim also recites the superposition vector, $P^= f(P)$. The superposition vector is the vector that will be processed through the entanglement operation. Claim 6, for example, simply defines the operations necessary to determine the positions and the values of non-null components of such a vector. The Applicants do not understand why the Examiner sustains that there is circular reasoning.

Examiner's response:

This is circular due to the fact that 'P' is a function of itself f(P). According to applicant P is the superposition vector prior to the entanglement operation and P is the

superposition vector after the entanglement operation. But P=P, therefore is P before or after the entanglement operation?

14. In reference to the Applicant's argument:

IV. The Claims Are Patentable

The Examiner rejected the claims over the Ulyanov et al. published patent application in view of the Cleve et al. published patent application. The Examiner cited Ulyanov et al. as disclosing the claimed invention except for "calculating indices (i) of the 2^n non-null components of the superposition vector as an arithmetic succession, a seed of which is 1 and a difference of which is 2^n

The Examiner cited Cleve et al. as disclosing this feature of the claimed invention. The Examiner has taken the position that it would have been obvious to combine the cited prior art references to produce the claimed invention.

The Applicants submit that the Examiner has mischaracterized Ulyanov et al. Ulyanov et al. is directed to Grover' s algorithm - and not to Shor's or Simon' s algorithm as in the claimed invention. Consequently, Ulyanov et al. is not relevant to the claimed invention.

Nonetheless, Grover's algorithm. uses superposition, entanglement and interference operations like all quantum algorithms. However, reference is directed to paragraph 296 in Ulyanov et al. - in which they are not the same for all quantum algorithms. FIG. 42 in Ulyanov et al. illustrates a Grover's quantum algorithm simulation including circuit representation and a corresponding gate design - which is different from the Shor's quantum algorithm simulation as shown in FIG. 6 in the Applicant's specification, for example.

Paragraph 512 in Ulyanov et al. refers to FIG. 20 that describes the general structure of an intelligent control system based on quantum soft computing (paragraph 47). Moreover, the mentioned "quantum search algorithm" is the Grover's algorithm (Appendix 4), not the Shor's algorithm.

As for the dependent claims, the function p (y) in TABLE 3.1 on page 11 in Ulyanov et al. is a Probability Density Function, while Pi in equation 6 in the Applicants' specification is a component of a vector.

Paragraph 574 in Ulyanov et al. does not teach how to calculate indices of non-null components of the entanglement vector in terms of an arithmetic succession, but illustrates in FIG. 25 comparison of "GA and QSA structures" (paragraph 50).
It is not apparent why the Examiner states that "Equal" of the Applicants' application is equivalent to "applied" of Ulyanov et al. Moreover, the Applicants do not state that the entanglement vector equals the superposition vector, but that "the value of non-null components of the entanglement vector equals the value of non-null components of the superposition vector, as it is evident by looking at equations (6) and (7).

Examiner's response:

Ulyanov pertains to simulations of quantum algorithms on classical computers. Portions of Ulyanov figure 42 do relate to figure 6 of applicant regardless if one is related to Shor's algorithm and the other relates to Grover's algorithm. The Examiner does not state that the superposition vector equals the entanglement vector but the entanglement vector is generated by the entanglement quantum operator.

15. In reference to the Applicant's argument:

The Applicants also submit that paragraphs 317-318 Ulyanov et al. do not teach a memory buffer for storing indices (i or k). Instead, reference in this paragraph is directed to computing P by applying Up to a register containing the superposition.

Examiner's response:

'Memory buffer' is equivalent to 'register'.

16. In reference to the Applicant's argument:

Referring now to Cleve et al., it is not apparent where the claim recitation "calculating indices (i) of the 2^n non-null components of the superposition vector as an arithmetic succession, a seed of which is 1 and a difference of which is 2^n" is disclosed. Cleve et al. is directed to simplifying the calculation of the Quantum Fourier Transform, but contrary to the Examiner's position, it does not disclose nor even suggest the Applicants' equation 6.

Even if the references were selectively combined as suggest by the Examiner, the claimed invention is still not produced. Accordingly, it is submitted that amended independent Claim 6 is patentable over Ulyanov et al. in view of Cleve at al. Amended independent Claims 9, 11 and 16 are similar to amended independent Claim 6. Therefore, it is submitted that these claims are also patentable over, Ulyanov et al. in view of Cleve et al.

In view of the patentability of amended independent Claims 6, 9, 11 and 16, it is submitted that the dependent claims, which include yet further distinguishing features of the invention are also patentable. These dependent claims need no further discussion herein.

Examiner's response:

'Arithmetic succession, a seed of which is one and a difference of which is 2^n' of applicant is equivalent to '$O(2^n)$' of Cleve.

Examination Considerations

17. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has the full latitude to interpret each claim in the broadest reasonable sense.

Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

18. Examiner's Notes are provided to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and sprit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but link to prior art that one of ordinary skill in the art would find inherently appropriate.

19. Examiner's Opinion: Paragraphs 17 and 18 apply. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Claims 6-23 are rejected.

Correspondence Information

21. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner Peter Coughlan, whose telephone number is (571) 272-5990. The Examiner can be reached on Monday through Friday from 7:15 a.m. to 3:45 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor David Vincent can be reached at (571) 272-3687. Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

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Hand delivered to:

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(571) 273-8300 (for formal communications intended for entry.)

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Peter Coughlan

11/30/2006

11/30/06

DAVID VINCENT
SUPERVISORY PATENT EXAMINER